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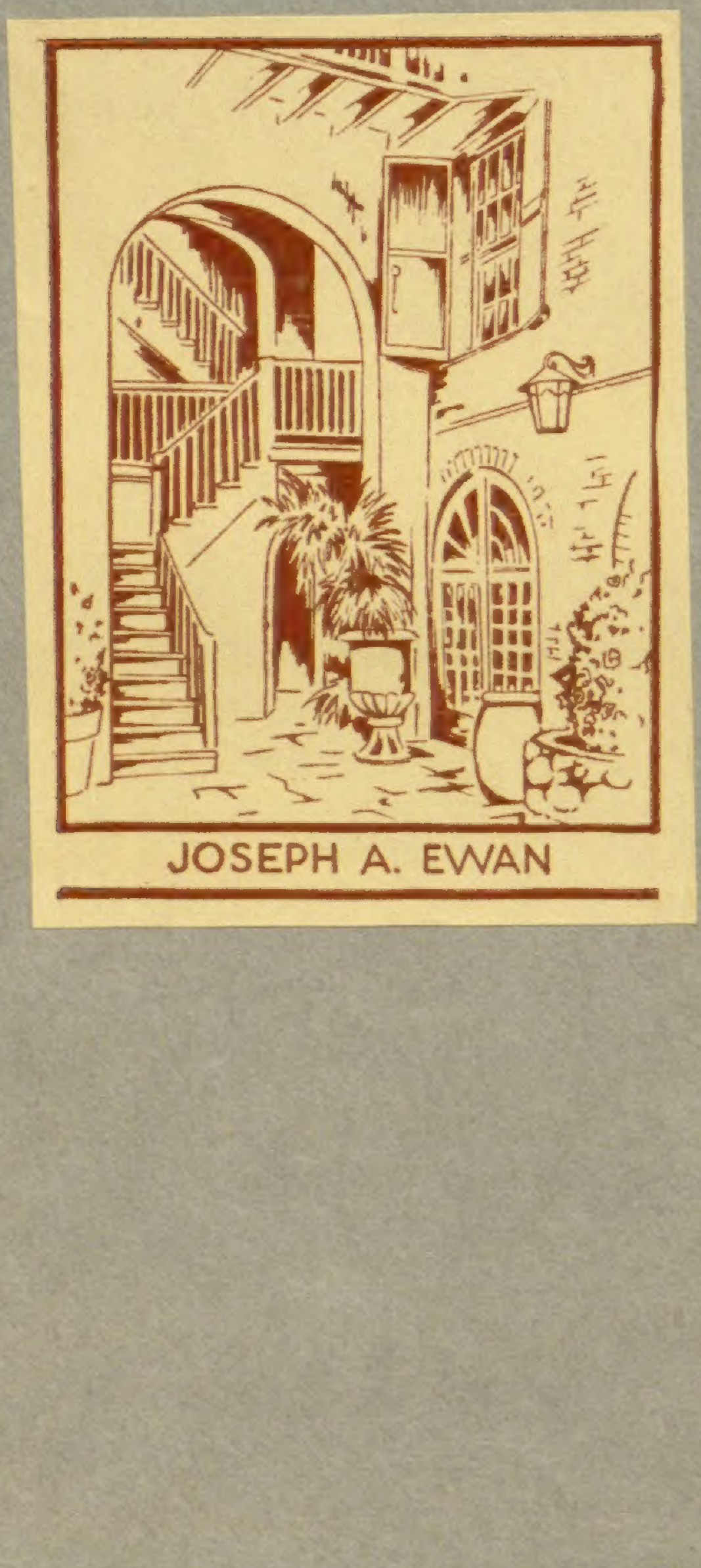

BOTANICAL REMINISCENCES

When I printed my notes on Botanists whom I have known I had no idea of the kind of reception they would have, nor did I care. I felt that any remarks about the older botanists would be welcome to some, as they would be to me to get any notes pertaining to Gray, Watson, Nuttall, Pursh, Torrey, etc. But it appears that there has been a general interest created by them, and request has come from several sources to continue them. I never intend to follow the beaten path, nor to trim my sails to suit readers, if they do not like what I write they can leave it. I think it a sin to tell only the palatable things about people. You never get a correct mirror of them in that way. I have no sympathy with concealing the truth about the dead. I abhor hero worship. When a man sets himself up as a little god I feel like taking a shot at him.

In Desert, responding to an insistent appeal for information I wrote my impressions of Engelmann, which also met with a general interest. I here reprint the article.

DR. GEORGE ENGELMANN

(Reprinted from "Desert")

I suppose in the lives of all of us there stand out men and women whom we feel honored to have known. One of them is the subject of this sketch. The other is Mrs. T. S. Brandegee, the greatest woman botanist that ever lived.

Dr. Engelmann was born in 1809, and after his education in Germany emigrated to this country and settled in St. Louis. He belonged to the pioneer age in American botany, a period when systematic botany was in the formative stage, when men had to guess as to what was a genus and species; when men had to delve deep into the secrets of Nature to find the laws governing the origin of the vegetable forms we call species and genera.

From the standpoint of quality of product I consider him the greatest American botanist. He belonged to the age of Bentham, Hooker, Torrey, Gray, Engelmann and Watson. Torrey was much older, having been born in 1798, Gray in 1810. Watson was much the youngest. All of them were educated as physiological botanists, not as systematists. They had to make systematic botany as we know it. We therefore find them emphasizing structure inordinately, and from this foolish standpoint we have not yet got far away. They had to work under the artifical system of Linnaeus, and it took many years to get away from it. The great task of systematic botanists is to devise a system of relationship, showing the genetic origin of all plants in order. Engelmann had to do with this system in which the highest plants were considered to be dicotyledons, then the next lower the monocotyledons,

then the polycotyledons, the flowerless plants, like the ferns and club-mosses, algae, and fungi and lichens. The dicotyledons were divided into polypetalae and apetalae. This was the order till the time of the death of Engelmann. Since the time of Engelmann, Engler and Prantl, and others since their time, have tried to arrange plants in the natural order, beginning with the lowest order and ending with the highest. This has brought order out of the chaos that prevailed in Englemann's time.

Engelmann, because of his microscopic methods of going into every detail of structure, confined his work to certain families and genera of plants. He was considered the court of last appeal in Cuscuta, Juncus, Yucca, Agave, the Coniferae, and Cactaceae. His reputation will always rest most on the magnificent Cactaceae of the Mexican boundary, done in stipple and lithographed on stone. No work ever produced in America rivals that production. His handwriting was execrable, fully as bad as my own, which my wife used to say I could not read when it was cold. He would write a letter or two of a word and then make a few wiggles to denote the rest of the word, and you had to make it out the best you could.

Like most great men, Engelmann was perfectly informal and approachable, as humble as a child. When he visited me in Salt Lake City, in 1880, I laid out on the bed a series of cactus specimens illustrating the intergradation of Opuntia Missouriensis and rutila, and I turned to him and said, "Doctor, tell me where Missouriensis begins and rutila ends." He threw up his hands in mock surrender and said, I suppose I shall have to suffer in Purgatory for making too many species of Cactaceae." Then he wanted to take a swim in Great Salt Lake. No visit to Salt Lake City is complete till you have taken a swim in the dead sea of America. So I was invited to go with him and Parry on the morrow, to the lake. On arriving we found much difficulty in getting a suit large enough to cover his ample midsection, for he was wider than a New York alderman there, but at last we got him duly covered ,and he walked out into the water. The ubiquitous Dr. Parry was supposed to be his chaperone and see to all details, but he had never been in the lake before, and so deserted the Doctor as he walked into the water. When Dr. Engelmann reached water up to his hips he was floated off his feet and promptly turned over, head down, and began to strangle, for he could not swim. After swallowing much water in his lungs someone saw his distress and went to his aid and set him on his feet, but he was nearly dead, and coughed terribly till the water was all out of his lungs. Then a very severe inflamation set in that sent him to bed for some days.

My correspondence with Dr. Engelmann continued till his death.

He was the head and front of the Missouri Botanic Garden and the great herbarium there. One of his most intimate friends was Shaw, a rich man, for whom Agave Shawii was named. Before Engelmann's death the garden was called the Shaw Botanic Garden, but after his death the name was changed to the present one.

Dr. Englemann was a most intimate friend of Gray and the other great botanists of his time.

C. C. PARRY

In the early years Parry, who lived at Davenport, Iowa got into correspondence with me because his name was the most prominent at that time, doubtless because he was the physician on the Mexican Boundary survey, and posed as a botanist. He was selected as the botanist of Capt. Jone's survey of the region of the Yellowstone Wyoming in the Teton region, and found a very small number of plants that were new at that time. A little later on he was appointed as botanist of the Department of Agriculture, the same position occupied by the genial Dr. Vasey later on..

Parry was a typical toady, as most men had to be to get a position in the Government service. He was a suave, well groomed society man with little brains, a great feeder of hot air, who slobbered over the great to keep in their good graces. He seemed to have pulled the wool over Gray and Engelmann though I doubt if he ever was a real friend of either.

I assume that he was with Gray and Hooker in their trip across the continent in the sixties, for he told me of the meeting of the two men with Greene in Silver City, New Mexico, where they spent the Sabbath with him and attended the service at which Greene preached on "Consider the lilies of the field" etc. Parry told me that Greene preached a very good sermon. It will be remembered that Greene was an Episcopal minister in charge of the parish at that time in Silver City.

Then in 1880 Parry accompanied Engelmann on his trip across the continent, and acted as a kind of chaperone for him. This was on the supposition that Parry knew the country, because he had spent a month or so in southern Utah at St. George botanizing, where he camped on J. E. Johnson for a month. During that time Parry and his wife were the guests of Johnson, lodged and boarded by him. I have spoken about him as being a typical grafter because after getting free board and lodging for a month (because he was such a famous (?) botanist), and when he left he presented to Johnson with much ceremony a thirty-five cent linen prover microscope as a memento of his visit.

My next acquaintance with Parry was in 1882 when I was on a botanical tour in southern California. It so happened that Parry was at the same hotel when I arrived. I did not know of his being there till he hunted me up and introduced himself and wife. He then informed me that Pringle had just come in on a botanizing trip, and he suggested that we three make up a party and go to Ensenada together. This was agreeable to me and it was soon arranged. Pringle was an old correspondent of mine, but we had never met. Parry took on himself to arrange for the trip by hiring a team and buggy of Mrs. Orcutt and employing her son Charley, a lad of nineteen years to go along as teamster and cook. I then learned that Charley was interested in shells and was a protegee of Daniel Cleveland who was also a resident of San Diego, a wealthy attorney and a great fern lover, and influential citizen. Pringle had his own outfit and a young man as helper.

So we started out with our rattle trap of an outfit and drove to Tia Juana and camped the first night. The next day we drove through the Valley of the Palms and botanized along the way. Charley Orcutt magnified his position till he became intolerable, and he was always toadying to Parry and neglecting his duties. So I took his aside and reminded him that I was paying half the expenses and expected service from him, and would see that he gave it if I had to beat him up. He saw that I meant business and after that sullenly obeyed orders. He was a gawky stripling with fuzz all over his face. That day we had to go over a steep hill and so I got out and walked up it and Charley drove. He was always gawking around and paying no attention to his driving, and going up the hill he fell out and landed on a shotgun which he had brought along for his own use, and he bent the barrel.

In a few days we reached Ensenada and camped along the beach. Parry at once ambled off to the town, and I went out on the hills to botanize. I found a new species of Cereus which I later named C. maritimus. On the way down to Ensenada, when we all three were in the buggy I saw a new rose growing in the brush and stopped the team to get out and collect it. My eyesight was better than that of anyone in the party or they would have seen it. I unwisely showed my new discovery to Parry and he climbed out and got some specimens, and later on called Pringle's attention to it. As a rule I do not show my collections to other botanists. Parry found some white people living in Ensenada, among them Miss Fish, whom he got to promise to send him collections, and who later on did send a few, among them some new species. After a few days there we started back for San Diego, quite well pleased with our trip. When we reached Tia Juana again it was Saturday night. I had never up to that time ever collected a specimen or traveled on Sunday, and so I wanted to remain there over the Sabbath, but Parry said he could not wait as he had urgent business in San Diego and had to get back at once. So he agreed to send Charley back in the morning with the team if I would not object to his going right in. Some months later on I found that Parry's urgent business was to steal my new rose from me by sending it in to Engelmann and having it published before I could attend to it. This was Rosa minutiflora.

Charley Orcutt did not come back till Wednesday, and he brought his big brother along with him, and it became evident that they were up to some bad business for they put up the team and went in to eat dinner without speaking to me. I felt that something was brewing from the sour looks of the pair. So as I had a big six shooter pistol that I always carried—and never used, I got it out and oiled it up so that it would shoot at least once without jamming, and strapped it on me. Then I went out and hitched up the team and got in prepared to drive to San Diego. At this juncture Charley's big brother who had stood around while I was hitching up sprang in front of the team and took them by the bits and said I would not be permitted to drive the team till I had paid my bill. There was no bill due till I got to San Diego. So I leveled my pistol at him and told him to get out of the way, and he did in a hurry. So I drove in to San Diego and let

him and Charley walk the twenty miles. When they got to town they went direct to the editor of the daily paper, the San Diego Union, and made out quite a weird story of my performance as a bad man. The editor made quite a half column of screed that was good reading. So when it came out the next morning I at once sat down and wrote the facts of the case and requested the editor to print it ,which he did. Then the oily Parry came to me and wanted me to pay my bill for the trip. I told him to bring it in and I would settle it as we had agreed. But when the bill came it contained among other items a charge of $10 for the ruined shotgun, and other extras. I promptly refused to pay any of them, but agreed to pay just what we had agreed on before the trip was made. So I gave him a check for the amount and told him to sue for the rest. Parry tried to scare me into paying extra by saying that they would arrest me for pulling a gun on them, and would give me other trouble. I told him to start the ball a rolling at once and I would stay an extra day to enable them to prosecute me. Being something of a lawyer I knew they could do nothing, and that they were only bluffing, and it turned out that way.

Parry remained in southern California till he wore out his welcome, for he was always sponging on people so long as they would permit it. His wife was an excellent lady.

That trip with Parry and me convinced Charley Orcutt that he was a great botanist, and he began to swell around like a toad. Later on he took several trips into Mexico and collected several new species. His chief difficulty was that there was not room enough in California for himself and other botanists. He was crooked financially, and impossible to get along with, and yet he had considerable talent, but the petting he received from Cleveland and others turned his head, and he never amounted to anything.

On our way back to San Diego we had a long hill to climb, and Parry said he would walk and cut across and meet us on the top. I also walked to relieve the team of my weight, and on going up the hill I found Draba unilateralis a new species. When we reached the top Parry was not to be seen, and I feared we had left him behind. So I stopped the team and went over to a hut near by where a young Mexican woman was standing, and asked her in my best English if she had seen an old man going along the road. She smiled sweetly and said "Quien sabe." Then I tried to manufacture some pigeon English, and conjured up all the Latin I could think of in various expressions to make her understand what I meant. But the reply was always the same. This was my first experience trying to talk to someone who could not talk English. Finally I had to resort to pantomime to get her to understand. At this juncture Parry showed up. I decided right there that I never would be caught in such a fix again. So I got a Spanish dictionary and reader and began to learn Spanish. Two years afterwards I thought I had become rather proficient, and could if conditions warranted make up out of Latin what I lacked so that I could talk to Mexicans. I was at El Paso, Texas, and it was hot and dry and I was hungry for a watermelon, for there were piles of them for sale along

the sidewalk, but I did not know the name for them. So I promptly walked up to a Mexican and said "Quanto dinero por una aguamelon?" He grinned and replied in perfect English "Five cents for a watermelon." I knew I had put my foot in it but did not know how. So I sneaked off behind a building and pulled out my dictionary and found that sandia was the name for watermelon, and melon was the name for muskmelon. Since that time I have been a little skittish about manufacturing Spanish out of Latin.

"THE PUSH"

If I were seeking public commendation I should be much gratified at the reception of my article on this subject. For I have received more commendation for it than for anything I ever wrote, showing a general feeling among botanists that something must be done to get rid of domination in botany in Government circles. I do not however care what the public thinks about my writings. They are printed to get certain facts before the public, and if the public does not like it, then it can go hang. A person who attacks anything must expect reprisals of all kinds, misinterpretations of his motives, personal spites, and the like. It has been my lot for forty years to be a court expert, where I have come up against opposition of intrenched authority in testifying against the inroads of greedy corporations. So I am not frightened by reprisals. Come on boys and kick up the dust. I will try to see that you get what is coming to you—and then some. Government circles have always been full of cowardly pussyfoots who would be shocked to death if they accidentally said their soul were their own. The colleges are now beginning to fill up with the same brand of half wits, while the really big men stay out, all because real men will not endure being bulldozed. So it is time that someone raised his voice to stop the evil.

To my mind there is no sin so heinous as that of assassinating a man by denying him his right to individual expression. And no man can sink lower than to become a cowardly pussyfoot.

In exposing the tricks of the cowardly pussy-foots, whose squawks are very familiar to those of us who have had to fight intrenched authority, I take the position that they have as much right to express their opinion as I have, and to print anything that they can get in print, and to put over anything that they can make stick, even if it is accomplished by guile and unprofessional methods. But I take pleasure in showing up the unprofessional and unscientific tricks as tricks when they come out, in order to forewarn the younger generation that all is not gold that glitters. If these men stood on their own achievements, and did not assume much more than they ever have done, there would be little opposition, but when my good friend Rose, in a moment of weakness attempts to put over the impossible by a bit of bluff as he did in replying to my strictures on his fake genera, I feel perfectly free to call attention to the bluff, and label it as such, and give my reasons for so doing.

So far as I know, Britton never but once tried this game on the botanical public when he attempted to discredit the work of Mrs. Brandegee by intimating that she had no "Botanical intuitions". Since then I have been calling on on him to show some "botanical intuitions" and up to date there has been no reply. Had Britton in the beginnig used the methods he has used of late, he would have got attacks only on his ideas, but as everyone knows who was doing botanical work forty years ago he did not play the game on the square. He had for years been plotting the downfall of Harvard, but was too cowardly to come out into the open until after Gray and Watson died. Then he put through the American Association a seemingly innocent vote to prepare a new list of American species of plants. This, on the face of it, raised no comment. But it was intended to give to him and his hand-picked committee, the sanction of the A. A. S. for anything they might propose, but it was not so understood by those who voted for it. A year later when the product of this committee was published as the official output of the A. A. S. and proved to be a new botanical system, it raised a nation-wide howl, and was repudiated by the great majority of the A. A. S. Then Britton had to take a new tack.

So he wrote to a selected few whom he thought were in favor of his scheme suggesting the formation of the Botanical Society of America. Even his hand-picked few turned the scheme down, saying the time was not ripe for such a move, but he went ahead and formed the Society with his rump coterie. Respect for the opinions of the botanical world required him to invite Harvard to help form this society. This was turned down and Robinson would not join it. Since then the organization has passed out of his control more or less and become more representative. Then Britton's last move (which should have been his first) was the starting of the North American Flora and its financing by himself. In this his peculiar views on botany are duly set forth by his henchmen, particularly Rydberg. But the assumption of superior knowledge and "botanical intuition" is conspicuous by its absence.

Britton's method is the effete one of Europe, which was rejected by Kew and the leading American botanists of the last generation, and I need not go into detail about it here.

WOOTON AND STANDLEY'S ASTRAGALI

It has been my privilege recently to examine the types of these proposed species. None of them are any good. In their key they show a gross ignorance of relationship, putting Sonorae (humistratus var.) next to lotiflorus; and albulus (humistratus) next to remulcus. In A. altus they do refer to its relationship to Rusbyi. It appears to be a form of strigulosus. On A. albulus there was written in plain hand by myself some years before the publication of this species, and on the type sheet that it was A. humistratus. There is no recognition of this fact in the description of this species. On

the contrary they say because of the incompleteness of the specimen its relationship cannot be determined. Now the facts are that this particular form of humistratus is the common one in the pass going over to Alamagordo, in the Organ Mts., just east of Las Cruces, in the spring, and its sheathing stipules are found in no other allied species, and it is common.

Their identification of A. tephrodes showed that they did not know the species, for they mixed it with other species with fleshy pods.

The whole "Flora of New Mexico" shows the same character of being done with a lick and a promise that characterizes all of Standley's work. He will not get very far in systematic work until he stops slopping through his work, in a mad effort to do a great deal in a very short time.

BOTANIZING IN TEXAS, 1930

In 1884 it was my privilege to botanize at El Paso in April and in the fall. The plants got there were unusually interesting, and led me to desire to revisit Texas at some later time and extend my visit eastward to the prairie region. For the only accounts we had were those of the railroad surveys and of Lindheimer. Later on Havard had done some work along the border mountains. I never felt that I could afford the trip till in 1903 when I went with my son to El Paso and thence to the Sierra Madres of northern Mexico. This trip was a very productive one in new species. But I did not get east of El Paso. But have had longing eyes for the region ever since. I abandoned collecting sets as a regular business in the eighties, and devoted my time to a more profitable work in economic geology. It so happened that I had two months' time to spare in 1930, and so I decided to employ it on the long-delayed trip to Texas.

I left Claremont, California April 1st. 1930. I drove to Shaver's Well, California. The next day I drove to Quartzite, Arizona, botanizing on the way, particularly at Blythe. The next day I drove to Aquila, a station west of Wickenberg, Arizona, where I got considerable stuff. Thence I drove through Wickenberg, stopping just west of there to study Canotia and collected a little. The next day I drove to Phoenix, and the next to Tucson. Then to the Huachuca mountains in Ramsey Canon where I was last year. Then I drove to Lowell a smelter town near Douglas. The next day I drove through Douglas and then on to Las Cruces, New Mexico. Then south 40 miles to El Paso and then east to Sierra Blanca, Texas. There was considerable out in bloom there on the mountain to the west. Then I drove to Davis Junction where the road forks. I took the lower road east instead of going to Pecos, for my destination was the experiment station at Sonora, which is some 90 miles north of Del Rio. At Sonora I found that the station was 19 miles south on a state ranch. So the next day I drove there and remained three days with the men connected with the work. We went pretty well over that region studying the vegetation and stock conditions. We then took a trip some fifty miles west to a stock ranch to examine con-

ditions of stock poisoning due to Oxytropis. Before we left in the morning the veterinary and I made an autopsy of a sheep that died the night before. My reason for being present was that for some twenty years I had been at the head of investigations on stock poisoning by smelter fumes in Utah and was familiar with clinical examinations of all domestic animals.

There are some twenty-six experimental stations in Texas devoted to the work of stock betterment and protection and agricultural experimentation.

The next day I also went with the veterinary to a ranch near Rock Springs where a number of valuable goats had died from weed poisoning.

As a result of all these examinations, I came to certain definite conclusions. In order for the public to get a proper alignment, to understand my position a brief statement of conditions is needed. Practically all of Texas is divided up into great ranches, and all fenced in with chicken-wire fencing. Then certain square miles or great areas are devoted to sheep, or goats, or cattle or horses, and here and there where conditions demand it wells are sunk and windmills erected to pump water into surface cisterns, from which it runs to troughs suitably located. There is no herding of the stock for the chicken-wire fence is supposed to keep out Coyotes. A general lookout is kept by ranch riders for predatory animals, and to see the condition of the stock and water supply. Winds frequently wreck the windmills and cut off the water supply. No particular watch is kept on the number of animals pastured on the ranches, but they are allowed to multiply as fast as possible irrespective of the quantity of feed available, and little or no attempt is made to raise feed to tide the stock over a dry spell. In ninety percent of the cases the range is so overstocked that the grass is eaten down to the roots all the time. That is, the range is sheeped out. This leaves bare spots where noxious weeds come in and grow luxuriantly. Because normal stock will not eat them. In fact wherever stock refuse to eat any plant it is sufficiently evident that the plant is poisonous. Now the question put to me was What must be done to prevent stock poisoning? My reply was "Send the big ranchers to jail for cruelty to animals." This is the key to stock-poisoning throughout the West. It is clearly criminal for anyone to put stock on ranges where there is no feed for them, and a few years in jail will do these men more good than any amount of argument. The experiment station men should be endowed with police authority to enter premises and see if conditions warrant the number of stock on that range, and if not, then the owner must provide the feed or get rid of his stock. When I was just west of Fort Davis, Texas, I passed a beautiful ranch where the grass was knee-high and the cattle rolling-fat. It so happened that I saw large patches of Loco poison along the road and got out to collect some. While I was at it the owner came along with his boy and wanted to know who and what I was. I said I congratulate you on being the only sensible rancher I have seen in Texas. He asked in what respect I meant it. Well I said your ranch is not sheeped out, and your cattle are in fine condition. So we became fast friends on the spot. He explained

how he did it by saying that he always kept feed on hand for emergencies and never overgrazed his range.

If our Government poison squad were allowed to do their own thinking instead of frantically chasing all over the country digging up weeds and testing them for poison they long ago would have suggested just what I am saying now. Any stockman knows that what plants their stock avoid are poisonous to them. And any stockman knows that under normal conditions stock are never poisoned if they have enough grass feed to eat. It is only when the range is sheeped out that they are forced in desperation to eat the harmful weeds that they get poisoned.

It surely was a surprise to me to find the range all fenced and none of the vast wild area of two generations ago, when the great cattle barons used to trek a thousand miles across the range to market with their herds. Del Rio, some 400 miles down the Rio Grande in the wildest of the wild region where the bandts and Mexican guerillas used to hang out I imagined would be composed of a few shacks, a lot of saloons, and a horde of swaggering cow-punchers. Instead I found a city of 4000 people, paved streets, electric lights and gas, and decent, well educated people and no cow-boys. Along the river where a person can wade across almost anywhere I saw no sign of smuggling, and I went to the river in three places many miles apart at the Hot Springs and the Indian Hot Springs. There was every convenience at the Indian Hot Springs including electric light and hotel accommodations. I saw only two Texas rangers, young men wearing revolvers conspicuously and in a way that no real gunman would ever wear one. I did not ask them if they were just from New York, but fellows wearing spats usually never lived in the region of overalls and high-heeled boots. I saw no young women smoking a pipe and only one flapper smoking a cigaret, and I could find ten times as many right in Los Angeles. I did not see half as many flappers in all Texas as I would see in my own home town. I guess the only place now to find the wild and woolly people is in the story books.

My chief interest in western Texas was to get a solution of the life zones there so as to check up with the rest of the west. To understand the life-zone situation one must know something of the topography and geology. So far as I have traveled, all of western Texas seemed to belong to the Cretaceous period topographically. There may have been a little Jurassic formation in extreme western Texas, but the general situation was that of a great Cretaceous plain elevated to about 2000 feet above the sea, and getting a little lower in elevation as you went eastward. This plain undulated somewhat so that drainage areas were formed which for the most part trended down ward toward the Rio Grande. The oscillation of the slopes due to erosion had a tendency to form escarpments along one side of a creek or river, or occasionally as with the Pecos and Devil's rivers forming box canons of short extent, but with these few exceptions the general surface was gentle in slope. In extreme western Texas there is little or no sod, and the prevailing vegetation is the mesquit or creosote bush or Chenopodiaceous

shrubs where the drainage is slight. But as we go eastward there is an imperceptible infiltration of sod grasses till at Alpine there are vast areas all covered with sod, forming real prairies, and we come to unmistakable prairie vegetation. I see no cause for speaking of the region as being divided by the Pecos.

This is characteristic of Wooton and Standley's Flora of New Mexico where one is led to expect a marked change on crossing that dribbling stream.

I am told that before the advent of fencing the range the whole region from Alpine east was a vast prairie, but now almost everywhere there is a forest of live oaks and attendant shrubbery. But one must not think that my discussion of the geology embraces the whole region. I mean the ground work of the region is an elevated floor of a Cretaceous sea where the rocks were mostly limestones. But it is well known that in any vast region like this volcanic activity must prevail, and here and there the strata are tilted at high angles into mountain chains, mostly low ranges, and in others there has been an exudation of lavas forming mountains such as the Chisos range. These diversify the surface and furnish many springs, but no running water except the Pecos and Devil's river, and the latter is the only one deserving the name of river. The mountains rarely reach 6500 feet elevation, and so do not seem to have much real forest except here and there in the gulches. And they have no alpine vegetation, and so far as I saw no spruce vegetation. At cloudcroft there was Middle Temperate vegetation, and the only range reaching 9000 feet alt. At Kent and Alpine the hills seemed to belong to the Lower Temperate, where the live oaks prevailed. All the rest was tropical, shown by the presence of Larrea and Mesquit. On the flanks of the low ranges just on the edge of the Tropical are vast areas of Yucca elata and macrocarpa, with a few patches of Agave. I have elsewhere given my reasons for discarding various species of Yucca and Samuela recognized by Trelease.

Going down to the Rio Grande river from Sonora off the high plateau to Del Rio I was greatly disappointed to find the river wending its way along a great plain, and to find a gradual infiltration of Mexican plants, but there was nothing like the great change in vegetation noticeable at Cajon Pass, California, or the region from Kanarrah to St. George, Utah, where the life zone limits are conspicuously sharp. It was a delight to see Lepachys columnaris and Gaillardia pinnatifida saying "Hello," as I passed along. It was a delight to come upon the buffalo and grama grass. It made me feel, that a few hundred miles more to the east and I would again be on the real prairies of Iowa. The presence of such genera as Engelmannia, Lidheimera and Zexmenia spoke unmistakably of the southern nature of the vegetation.

A SWING AROUND THE CIRCLE

After completing the identification of my Texas plants collected in April, I had a month's time on my hands, and decided to revisit the Little Colorado region that I explored in 1890, forty years ago. I knew that there is seldom any rain on the desert, and only then can one expect to get plants of interest. My experience in Texas had led me to think that I would find a fine flora on the Little Colorado. On June 10th I started for Flagstaff, Arizona. I drove east to Amboy and then north to the Providence mountains for a few day's work, but the flora was too far gone to get much of interest. Then I passed through the Needles where the temperature was 115 degrees. Then up to Oatman where I found several interesting species, among them an apparently new Agave and Nolina Bigelovii in fine shape. Then on to Hackberry, where I was most agreeably surprised to find Canotia in fine shape. A new locality for this rare genus. Then on to Flagstaff, finding interesting things along the way. Then north to Cameron and Tuba City, hoping to find the new species I got there forty years ago. But there had been no rain in that region for three years, and so my trip was in vain. Even on the Kaibab where there usually is ten feet of snow everything was bare. So I went on to Kanab, and then up the Vergin to the beautiful Hidden Lake where I found much vegetation. Then on to Panguitch and Salt Lake City. Everything was green and fresh on the way.

Then after a day visiting at my old home I left for Elko, Nevada, and got the very rare Eremochloe Kingii Watson at Wendover. Then I drove north over very bad country roads to Owyhee and Mountain Home, getting interesting plants on the way. From there I went west along the Columbia highway over fine roads to Arlington, Oregon, where I ferried across the Columbia, and then drove up on the great plateau to Bickleton. Then back to La Grande, Oregon, and the Wallowa mountains at Wallowa lake, where I botanized two days. Then back to Baker City and south to Stein's mountain, some 200 miles towards Winnemucca Then to Winnemucca, where I took a side trip to Battle Mountain to get Astragalus pterocarpus, the only known locality for it. It was obliterated in the type locality, but I found plenty of it a few miles away. Then back to Winnemucca and on to Lake Tahoe. Then home through Sacramento to San Joaquin valley. None of the region was new to me except Elko-Owyhee, and the Baker City Winnemucca trip. The roads in that region were very poor but passable, but the main highways were fine.

My reason for visiting Stein mountain region was to get onto the flora where Cusick many years ago got some fine things, but I was too early for the high flora and too late for the low flora, but in spite of this I got many interesting things in this region which is so hard to reach.

LOCALITIES IN LOWER CALIFORNIA

In my botanizing in the lower part of Lower California there were few localities visited. In 1926 I botanized at La Paz, which is on the gulf on the east side of the peninsula, and is the capitol of the southern half of the peninsula. Most of my work was along the shore line to the east of the town. I also took a trip to San Antonio, 44 miles south, which is on the stage route to San Jose del Cabo, and is up near the divide leading over to San Bartolomo, and is in the hills. The same year I took a trip of 20 miles south of Hermosillo to a silver mine in the Yaqui region. I also got a few plants at Carbo on the main railroad line south of Nogales.

In 1927 I went straight to San Blas, Sinaloa, which lies about 40 miles east of Toplobampo Bay, and to Los Mochis which is only 10 miles east of it. Then after stopping at Mazatlan I went to Tepic, the old and famous town in the old state of Tepic, now called Nayarit. From there I went to Ixtlan, a small town on the railroad some 70 miles east, then to La Barranca, a little station on the edge of the great barranca where they were building a bridge. This place is about 65 miles northwest of Guadalajara.

In 1928 I went by boat direct to San Jose del Cabo, which is 14 miles east of Cape San Lucas, and the only big town in that region. It has no harbor, boats having to land through the surf. Some 40 miles east of it is the pretty little town of Miraflores, on a river coming out of the Laguna mountains, where I took my horseback trip up those mountains, going ten miles west before turning up a river leading to the heart of the range. Ten miles east of Miraflores lies Santiago, and some 20 miles farther and on the coast lies the Ranch by the Sea where I did a little collecting. After leaving the ranch by the sea the road goes along the coast a few miles farther and then follows up a draw to San Bartolomo, which is near the crest of the mesa region and has some magnificent springs and raises much fruit.

The only other place needing mention is Todos Santos, on the sea, and 60 miles west and south of La Paz. I went 20 miles east of there to the foot of the Lagunas at the Coda ranch. I also went some 14 miles west of La Paz on the mesa which extends to Magdalena Bay, to get the persimmon growing there.

LOCALITIES

Shaver's Well, Calif. This is 12 miles east of Mecca, near the crest of the range and at the upper end of the canon, and just on the upper edge of the Tropical life zone.

The Hayfields. This is at the foot of the range and 14 miles east of Shaver's Well and 20 miles west of Desert Center.

Blythe is on the Colorado river, and at the end of the beautiful road from Mecca. It is only a few hundred feet above sea level and is very hot in summer.

Quartzite, Arizona. This is up in the hill country, 19 miles east of Blythe and in a valley among the mesquite. Going over to it, the road passes through a limestone area where the soil is very scanty. Quartzite itself lies back in the sandy area.

Aquila, Arizona. This lies some sixty miles east of Quartzite, in the sand soil of the plain, which extends to the hills just west of Wickenberg. Going over these hills we meet Canotia growing on the rocky slopes among the mesquite.

Wickenberg. This lies near the head of the Hassayampa river at the Junction of the Blythe-Phoenix and the Phoenix-Prescott roads. Here the Blythe road turns south to Phoenix.

Sacaton. This is on the Salt river south of Phoenix, a Government experiment station. I took the Casa Grande Ruin road out of there instead of going south, and passed by the eastern edge of the low range south of Sacaton, where I botanized on the boulder strewn hills.

Huachuca Plain. This term is used for the region east of Fort Huachuca, near the mouth of Ramsey Canon.

Ramsey Canon. This is the third canon west of the north end of the Huachuca moutains, and goes up to the crest of the range.

Benson. This is a station on the Southern Pacific R. R., about forty miles east of Tucson, where the road forks going east. Stein's is a station on the railroad nearly north of the Chiricahua Mountains and east of Bowie.

Texas Canon begins a mile or so west of Dragoon station, and leads down to the plain which leads to Wilcox and Benson. It is a short stretch winding down through huge granite boulders along a small creek.

Rodeo. This is the first station on the railroad east and north of Douglas on the plain.

Going east from El Paso over the plain, Sierra Blanca is quite a town and supplies the adjacent farming and grazing region. It lies at the foot of a range running north and south which is covered with a Yucca forest. A road runs south from here to the Rio Grande river and Indian Hot Springs. The main central highway runs east from here to Van Horn, where the road branches so that one goes southeast to Del Rio, along the border; and the

other goes east a short distance to Davis Junction where it again forks, one going east to San Antonio and the other northeast to Pecos. At Van Horn a main road also goes north to Carlsbad, and it was here that Pine Tree station is located, which is at the top of a hill going up from the plain north of Van Horn. This place is important because here is the dividing line between two life zones. From this place the road continues northward to Carlsbad Junction and then eastward to Carlsbad, and northward from there to Artesia, 35 miles, where I turned westward to Cloudcroft, Alamagordo and Las Cruces.

LOCALITIES IN THE SWING AROUND THE CIRCLE

At Amboy I turned north to the Providence mountains, passing on the way the beautiful spring in the cove of the Old Dad mountains where I got most of my specimens on my previous visit to that range. On this visit I went some ten miles farther to the Barnes ranch at the foot of the Providence. From there I took an auto trip south to the Old Dad range at some springs which are on the north side of the mountains. Then returning to the ranch I returned to the main highway east of Amboy and went on to the Needles.

East of the Needles Oatman lies near the top of the first range east of the Colorado river and here we get almost out of the Tropical life zone. Then we descend to the plain again and go on to Hackberry where the railroad goes up a canon in a low range. It is here just before we enter the canon, that we come across Canotia covering the hills much as the juniper does. From here there is a gradual ascent to the great Mogollon plateau, passing through Kingman, Peach Springs, Seligman and Williams; the latter being on the plateau in the yellow pine timber, in the Middle Temperate life zone. Peach Springs is near the lower limits of the Lower Temperate life zone. Williams is just in the edge of the Middle Temperate. The whole Mogollon plateau, except along its edges, is in the Middle Temperate.

Going north from Flagstaff toward Cameron's, we soon get out of the Middle Temperate and down into the Lower Temperate, and continue in it to below Cameron's where there are traces of the Tropical coming in. Tuba City is nearly east of Cameron's and on a branch of the Little Colorado, the Moencopa river, and is fed by springs cropping out near the top of the cliffs in the Jurassic formation.

House Rock is the old name of a water hole near a rock looking like a house, some 40 miles west of Lee's Ferry. But the old House Rock has been abandoned and an oil station near the base of the Kaibab some four miles west of old House Rock now has that name. There is a house there and a fountain fed by a pipe line where one can get fine water. All this valley now called House Rock valley is a big stock ranch or series of such ranches. From this valley the great whale-back called the Kaibab rises half a mile or more into the sky.

Kanab lies at the foot of the cliffs, which farther north and east form the famous Bryce canon.

From Kanab the road goes up Kanab Creek and over a divide and down to Mt. Carmel and the string of towns that lie along the upper Vergin river. Orderville is one of these towns, and not far above it lies Hidden Lake, a unique spot that no one should miss. This lake was formed by a slip of the cliffs forming the valley and is about five acres in extent, and surrounded by much vegetation. I did some botanizing here and along the river towards the summit. All this region is in the yellow pine belt.

Going west from Salt Lake City and around the north point of the Aqui range west of Grantsville, I collected some on the cliffs and along a wash before I got out on the main desert, the real bed of the Great Salt Lake.

There was nothing of interest crossing the salt beds till I passed Wendover and was climbing over the hills which had many patches of the very rare grass, Eremochloe Kingii, which looks like a Tricuspis or Munroa.

Elko is a well known station on the railroad, and from here starts the road leading north to Tuscarora, Owyhee, Mountain Home and Bruneau. From Owyhee, here and there, to Bruneau, are arid patches bearing a peculiar flora such as Mentzelia, Astragalus Toanus and speirocarpus, etc.

Owyhee is on a flat near a great lava mesa, and the flora is mostly Middle Temperate meadow formation. From there northward the road drops down some to the level of the Snake river clay bluffs, whose sides are scored by rain and rather bare, but what plants are found are interesting. Owyhee and Bruneau are not far from Mountain Home.

North of Weiser, on a fork of the Weiser river, is Mann's creek on the highway to Cuprum, Meadows, etc. This was an interesting region in the early spring because of the umbelliferae growing in the gumbo soil of the bluffs. But I was too late for that flora.

Stanfield is near Umatilla. Bickleton, Washington, is some 26 miles north of the ferry at Arlington, which is 65 miles east of the Dalles on the Columbia. Bickleton is on the high plateau and in the Middle Temperate life zone. To the north of it some ten miles is a long and high ridge covered with Pinus ponderosa and quite a varied forest flora.

After my visit to Bickleton I drove back to La Grande, Oregon, and from there drove 65 miles east to Wallowa lake, which lies behind a glacial terminal moraine at the mouth of a canon in the upper edge of the Middle Temperate life zone. From there trails go up into the high Wallowas above timber line.

Returning to the main highway at La Grande I drove back to Baker City, and from there southward to Winnemucca along country roads. After passing over a great mountain swell south of Baker I came down to the head of the John Day river, and followed down to Prairie City, a beautiful country town on a real prairie. From there it was not far to John Day town and Canon City, where the ground is all torn up by placer mining for gold. From there the road follows up a long way and over onto meadows in the parklike country to Burns, which lies out in the sagebrush area near the Mal-

heur lake and alkali flats. Princeton is a mail station east and south of Burns on the edge of Malheur flats, and at the base of a long lava mesa.

Then the road turned southeast, going over and through the north end of Stein's mountain and down to Alberson's ranch on the east side of the range. Then down to the old Alvord ranch on the east side of the range which lies just east of the highest part of Stein's Mt., on the edge of the desert. From here the road goes south to Field's and Denio, the latter being on the line between Oregon and Nevada.

From here to Winnemucca is a succession of flats and low volcanic mesas and sagebruch to Winnemucca.

Throughout htis region the season was past for plants. In going around the divide leading over on to Carson desert, and going out of this area near Wadsworth, there was an interesting group of plants got along the way in the sand. This region is about 4500 feet alt. above the sea.

Lake Tahoe is in the Middle Temperate life zone mostly.

La Grande Oregon. There may be some misapprehension about the spelling of this name. It is not Spanish but French from those who first settled the region. There seem to have been many Frenchmen in the logging camps around this place in the early days. It is on the beautiful plateau that is inclosed by the Blue mountains on the southeast and the Wallowas on the east, and an extension of the Blues on the west. It is a magnificent and nearly level valley all grassed over, and has a very fertile soil of black loam; and is well watered by streams coming down from the adjacent hills.

ECOLOGICAL NOTES

For nomenclature see Contributions No. 13. It may be well to say that Merriam's Lower Sonoran is Tropical, his Upper Sonoran is Lower Temperate, and his Transition is Middle Temperate.

Practically all of my Texan trip was in the Tropical, which I did not get out of except a little in Huachuca Mountains, a small area west of Silver City, New Mexico, at Cloudcroft; and the region around Artesia and westward, which probably was Lower Temperate. Near Sonora, Texas, the crests of the hills show an influx of Lower Temperate, but there is no good zonal plant to use as a guide in that region, for the Juniper is surely J. occidentalis var. monosperma, and not Utahensis, and it is not subject to the zonal limitations of Utahensis.

In the June-July trip I did not get up into the upper zone in the Providence and Old Dad mountains. A little east of Hackberry, Arizona, the Lower Temperate comes in and continues nearly to Williams before it gives way to the Middle Temperate, which continues some ten miles east and north of Flagstaff, where it gives way to a wide belt of Lower Temperate which in turn transits to the Tropical at Cameron's and continues to House Rock. The lower slopes of the Kaibab are typical Lower Temperate, and

give way to the Middle Temperate which covers the bulk of the Kaibab, except on north slopes and tips of ridges which are Upper Temperate. Going north to Kanab we get down into the Lower Temperate and continue in that zone far upward toward the divide leading over to Glendale, and at and near Glendale we get in that zone again, and this zone continues up the Vergin many miles until it gradually fades into the Middle Temperate, which continues over the summit to and below Panguitch. Near Marysvale we get again into the Lower Temperate and continue in it to Salt Lake City.

West of Salt Lake City we are in the same zone to and beyond Wendover where we gradually get up into Middle Temperate on the summits we cross as far as Wells and Elko. North of Elko the vegetation is mostly Middle Temperate, but here and there are patches of the Lower Temperate in favored places toward the south. The Weiser region is all Middle Temperate, with practically no lower Temperate anywhere that is truly typical. This continues to Umatilla whose flora just borders on the Lower Temperate. The hills are all Middle Temperate with here and there patches of Upper Temperate. The Blue mountains and Wallowas go up into the Arctic or Alpine, which is also true of the Seven Devils mountains. Going south from Baker City to Winnemucca we gradually get out of the spruce (Upper Temperate), and down into the Middle Temperate to or near to Burns. From there south is a gradual transition to the Lower Temperate at Winnemucca and which continues to and beyond Wadsworth where there is another gradual transition to the Middle Temperate which covers the Tahoe region. In the latter region all the ridges and peaks go up into the Upper Temperate. Between Colfax and Auburn we get again into the Tropical and continue southward throughout.

NOTES AND NEW SPECIES

Cheilanthes Jonesii Maxon. It is unfortunate that this species was named after me. From all that I can learn it seems distinct from Notholaena tenera, and the rudiments of an indusium would place it in Cheilanthes. I was not the original discoverer. I should judge that J. E. Johnson of St. George, Utah, was the discoverer, some ten to twenty years before I got it at the place of discovery. I do not recall who called my attention to it. It might have been my old friend John Reading, or some one at St. George. The plant grows in the horizontal crevices of limestone rocks at the only water hole on the old road to the other side of the Beaver Dam mountains, some four or more miles west of Santa Clara City, Utah, and two miles farther from St. George. It is very rare, and has all the habits of a Pellaea. No one would ever take it for either a Cheilanthes or a Notholaena.

Bigelovia albida Jones. I was agreeably surprised to find this on the alkali flat just south of Denio, Oregon, about 165 miles north of Winnemucca. The type locality for this plant is Wells, Nevada. It has since been found by Hall in the Escalante desert, Utah, and by me at various

localities on the western side of the desert which marks the western edge of Lake Bonneville, in the region from Wendover south to east of Osceola, on alkaline flats.

THE PALMS

In commenting on the flowering of the palms I remarked last year that they had bloomed again here in cultivation, but did not set much fruit. The same trees have bloomed copiously again this year, in fact better than in 1928, and they will set fruit copiously again. But the past history of the palms is that they seldom fruit, as shown by the old peduncles still hanging on the trunks. The continued fruiting lately is certainly due to the unusual rains we have had. Yucca Whipplei bloomed again this year almost as copiously as before, but Mohavensis hardly bloomed at all, because of its remarkable blooming last year.

Agave Utahensis var. discreta n. var. Plants with the general habit of Utahensis and about ten feet high. Leaves subulate from a broad base and about 6 inches long, tapering into a stout spine an inch long, with margins smooth and straigh and with rudimentary prickles ¾ inch apart and with black base. Cross-section of leaves flatly triquetrous, leaves arcuate inward. Many peduncles several feet long, and ending in a very loose panicle with racemose rays rather distant as in applanata, and with flowers congested at the ends of the rays. and yellow, and not in an uninterrupted spike as in typical Utahensis, tube of perianth 1-2 lines long, and flowers not an inch long. Fruit not seen. Near the top of the divide above Oatman, Arizona, and along with Nolina Bigelovii.

Agave Utahensis var, scaphoidea (Greenman and Roush) A. scaphoidea Greenman and Roush. I cannot see any specific character in this proposed species.

Nolina Bigelovii (Torr.) Watson. The type locality of this species is Bill Williams river, western Arizona, which stream flows just south of the Chimihuevis Mt., Arizona, in other words just south of Oatman. I found this growing finely near the top of this range on which Oatman lies, on slopes in rocky places and continuing nearly to the foot of the range, Tropical life zone. The plant grows mostly in clumps though occasionally single stalks occur. They seldom have much of a trunk. The leaves are clustered in a fascicle at the top where the erect peduncle arises. The leaves are about 3 feet long and flat and not rough on the margins, an inch wide, and taper to a rather spinose tip, and the peduncle carries the magnificent panicle clear of the leaves, the panicle being much longer than the proper peduncle, and a compact lanceolate mass several feet long and tapering upward. The flowers are white, in a dense and spike-like raceme, 4-6 inches long, which is ascending and arises from the 1-2 foot long rays of the panicle. The flowers themselves are about 2mm. high and 4 mm. wide, with segments 2-3mm. long and oval-cup-shaped, acutish, very hyaline but with strong

midrib, and tissue-paper-like, and at last rotate spreading,| being crowded out by the inflated ovary. The anthers on the pistillate flowers are ovate and on filaments flattened and about half as long as the floral segments. The ovary is crowned by almost sessile and minute spherical stigmas. Pedicels jointed below the middle and about 1/4 inch long. The flower arise from a bracts are about as long as the floral segments fimbriate-lacerate above. bracts are about as long as the floral segments and fimbrine-lacerate above. Apparently the anthers of the pistillate flower are sterile. In the staminate plants there are no ovaries, the flowers are globose,}nearly 2mm. long, ochroleucous and closed at first, and with segments more elliptical and with midribs scarcely visible. {The anthers are versatile and oblong, 1 mm. long, and with faces vertical and facing inwards and opening into two discrete halves, and full of yellow powder. The pedicels of these flowers are jointed near the tip and about half as long as in the fertile flowers. I have no doubt that the stamens in the pistillate flowers become at times fertile, but I see no signs of it in the specimens gathered, and the plants are therefore dioecious, and 6-10 feet high.

Allium Haematochiton. As far as I can learn, all the southern Californian material referred to thi sspecies, outside of San Luis Obispo region is what Davidson has described as A. Marvini. It is true that Davidson founded his species in a white-tunicated form, supposing it to be distinct from the red-tunicated one, but in this he is in error. His species figured accords fairly well with our usual form except the white bulb scales. A. haematochiton is described as having a conspicuous rootstock, and purple flowers. A. Marvini has all the usual characters of the Cernuum group except that the peduncles are not nodding but erect and round in cross-section. Marvini has the periant segments oval-ovate and acute, about 5mm. long, white, rarely pinkish, with a green or bluish stripe at the tip on the outside. The ovary is truncate and with low crests running from the style to the base and spongy. The bulb scales are conspicuously ribbed by the meshes which are linear, usually 10 times as long as wide and with right-angled ends, though sometimes they are diamond-shaped on the same bulb scale, at the ends. Normally the bulb scales are brilliant red or purple, and very thin, and many. All the bulbs of this group grow in bunches, rarely single, and the collar is thick and long with several leaves which are long and tapering and very narrow, and there is no sign of a rootstick. The plants are usually about a foot high, growing in tufts on clayey slopes where there is a little seep of water in the spring. They grow only in the Tropical life zone, and bloom early, mostly in March. Davidson's type was got near Beaumont. It is frequent at Puddingstone Dam, near San Dimas.

Allium. The reticulatum group of this genus is very common in western Texas, growing on plains in open places. The group is characterized by the close and very fibrous coats of the ovate bulbs, with meshes close together. The bulbs propagate by division, mostly into two bulbs. A. Nuttallii (A. Helleri Small) is about a foot high and slender and without any but very minute central crests. The flowers are mostly white or pink and small. I

have it from Rock Springs, Texas, April 16, 1930; Ozona, April 13, Sonora, April 14; North of Del Rio, April 17, and at Del Rio. Shorter and less slender forms but crestless with slightly longer flowers arer from Rodeo, Arizona, April 8, 1930, Rock Springs, April 16, 1930, and Sierra Blanca. A. reticulatum differs only in the strong central crests and in being a little stouter. The flowers have a tendency to be bluish along the midrib, and the bulbs are often several in a cluster. I have it from Indian Hot Springs along the Rio Grande, April 30, 1930; Sierra Blanca, April 10, 1930; Del Rio, April 20, 1930, Lordsburg, N. M., May 5, 1930. The character separating this species from Nuttallii is only the crested ovary, a somewhat shaky one.

Allium Bigelovii Watson. This well marked species is less than six inches high from the bulb which is 2-3 inches deep in the ground. The leaf is single and arcuate but not flattened nor wide, and overtops the flowers. The umbels are large and about 20-flowered, with rather stout pedicels ¾ inch long, and with the white flowers with conspicuous and deep red midribs and tips, and segments about half an inch long and lance-ovate-acuminate. The crests are central, erect, petal-like and nearly as long as the capsules. The bulbs are globose-ovate, about an inch long and with deep reddish-brown outer coats separating readily. The bulbs propagate as in A. bisceptrum but without runners. The markings on the coats are well figured by Watson Bot. King, t. 38 f. 8 and 9. The walls of the meshes are a little uneven but not really sinuous as in A. bisceptrum. My figure 53a near tip is about the same, as given by me in Cont. 10. I found this only growing in the live oaks west of Silver City, N. M., May 5, 1930.

Allium Coryi n. Sp. Allied to reticulatum group. Growing on grassy plains at Alpine, Texas, April 26, 1930. Plants about six inches to a foot high, slender, erect, with 2-3 basal leaves half as long as peduncle which are very narrow and straight. Bulbs ovate, with very many yellowish-brown reticulated coats from which the very thin and hyaline membrane has disappeared leaving the meshwork only. Bulbs propagating by division as in Nuttallii. Sheaths of the umbels about as long as pedicels (1-2 inches). Pedicels slender. Flowers about 10, chrome-yellow, 3-5 mm. long, rather ovate. Perianth segments oblong-ovate triangular-acute, the outer ones with strong midrib. Ovary globose, crowned with thin and flat low crests on the angles. Odor alliaceous. One tries very hard to put this in Nothoscordium, but the bulbs and color are that of an onion. This is the only native yellow onion. Anthers elliptical, on fllaments nearly as long as the perianth. Dedicated to V. L. Cory of Sonora, Texas, an indefatigable botanist.

Nothoscordum Texanum N. Sp. Bulbs depressed-globose, about 2 inches wide when mature, of many hyaline and very thin coats onion-like, the markings being much like those figured in No. 52, second figure, in my Cont. 10. Below and at the base of the bulbs are produced one to several shining bulblets within the coats. The stems are 1 to 1 1-2 feet high and erect and slender and about as long as the very narrow leaves which are uniform in width and basal and about four. Bracts hyaline, about an inch long, two,

pedicels 1-2 inches long. Flowers about ten, half an inch long, whitish or yellowish or purplish, with green base and green nerves, with the erect perianth broadly linear and rounded at tip. Anthers broadly linear, on filaments about half as long as the perianth. Capsules about globose, 3 mm. long, low-crested. Bulbs deeply set in the ground, often about 6 inches deep. Rodeo, Arizona, April 8, 1930. On plains. Also at Del Rio.

Nothoscordum striatum Kunth. (N. bivalve (L) ?). What appears to be this species I have from Rock Springs, Texas, with small bulbs half an inch long and with smaller flowers.

Yucca. To me the treatment Trelease gave the Yucceae in his revision, after having gone over the ground carefully reveals a gross lack of discrimination. He founds the genus Samuela on the gamophyllous base of the perianth, and in doing so he shows lack of any careful study of the various species growing in the field over which he traveled. I have now carefully studied all the known species from California to central Texas. One of the first surprises was finding a most remarkable variation in the length of the base of the perianth. Years ago when I first studied Yucca baccata at Leeds, Utah, and Mohavensis at Mica Springs, Arizona, in 1894, the pear shaped flowers seemed characteristic with their long basal perianth. Then thirty years later when I again studied Mohavensis at Banning, I found the flowers often almost rotate but no other difference. An extensive examination of individuals soon revealed that the flowers varied greatly from pear-shaped. I found little variation in Yucca Whipplei in that regard though there was some variation. Then in 1929 I found the flowers of Y. elata much like those of Whipplei, none others being in bloom.

Sierra Blanca, Texas, was one of the localities specially visited by Trelease before he published his revision, and on the plants growing there he founds his genus Samuela with its two species. In the later part of April, 1930, I spent some time there trying to unravel the tangle made by Trelease. Back of the town to the west on the mountain are many scattered Yuccas of all ages and sizes, and many of them were in bloom. Trelease seems from my study of floral conditions there, to have selected extreme forms of Yucca on which to found his genus Samuela. On the mountains west of Sierra Blanca are a few trees about ten feet high, which conform well to his type species of the genus Samuela Carnerosana. These trees stand out from the Yucca rut as taller and with larger trunk, and with a short peduncle from half as long as the very long leaves to fully as long, and then the magnificent white panicle rises clear of the leaves in a rounded to ovate mass 2-3 feet long, and when fully mature has horizontal branches bearing several flowers. These flowers are very narrow, pear-shaped and drooping, and each branch of the panicle has magnificent and large white bracts. The flowers have a conspicuous tube. The apple-green leaves have the conspicuous fringe figured by Trelease. Taking these plants alone one would at once recognize the new genus as a good one. But when we come to study the area throughout and far down toward the Indian Hot Springs, many square miles of them, we find a very different condition,

that any acute field botanist would recognize at once. Normally the great panicles surpassing the leaves when in flower stand out as landmarks, but when you come to study all the vegetation you find many panicles among the leaves. Then you find leaves without the fringe, you find blue leaves either very thin or very rigid, and two to four feet long, almost flat or deeply sulcate. Then the flowers vary from typical to almost rotate and with or without a tube. You find flowers two inches and flowers four inches long. The whole pseudo-forest region seems to be a unit in its Yucca vegetation. You do find, here and there, a few Y. elata, but this species is not at all related to the edible-fruited Carnerosana. Now what is a person going to do? Use the Greene method of selecting aberrant forms to represent the new genus or to discard the whole as unscientific and revert Samuela to Yucca where it belongs. After seeing Trelease's type localities for his two species of Samuela, I do not hesitate to discard the whole thing at once as unwarranted. Trelease did not know the distribution of his proposed genus. I found it growing at the Colossal cave, Arizona, and in the Organ pass it passes imperceptibly into Yucca baccata. There seems to be a gradual intergradation from Yucca Schottii to the macrocarpa of the plains, and from that to Y. Mohavensis of California I have already called attention to the interbreeding of Mohavensis with baccata. I have now been studying closely for seven years the various forms of Yucca and I find that Y. Mohavensis very often has the pear-shaped flowers of baccata though most of the forms have nearly rotate flowers. The panicles of Mohavensis are almost always sessile among the leaves, as are those of baccata, but baccata never has a trunk, while all the others have a trunk at maturity at least. There is no way to keep up the species of Yucca as interpreted by Trelease except to ignore all ecological facts and rest arbitrarily on variable characters. I cannot see any real distinction between Y. augustissima and elata, except the sesile inflorescence of the Utah forms. In central New Mexico and adjacent Arizona there is no telling the forms apart by the leaves. Trelease would put all forms of flowers of Y. Treculiana without manifest tube into Yucca, and those with tube into Samuela, but there is a gradual intergradation, and no possibility of separating them in the field, by any floral or vegetative character.

Calochortus Nutallii T. & G. on the banks of the Gila river near Silver City, N. M., May 4, 1930.

Sisyrinchium Arizonicum Rothr., Rock Springs, Texas, April 16, 1930.

Iris Missouriensis Nutt. Cloudcroft, N. M., May 2, 1930.

Nolina Texana Watson. Hope, N. M., May 2, 1930; Valentine, Texas, April 28, 1930.

Agave heteracantha Zucc. Hot Springs, Tex, April 24, 1930. This is very common on limestone areas along the Rio Grande, ocurring in great masses. It was just coming into bloom. The flowers are a very deep purple.

Nothoscordum striatum Kunth. Rock Springs, Texas, April 17, 1930. This appears to be quite common but was hardly in bloom.

Brodiaea capitata var. pauciflora Torr. Aquila, Arizona, April 4, 1930; Lordsburg, N. M., April 9, 1930.

Yucca macrocarpa Eng. Bot. Gaz. 6 224 1881. Plain near mouth of Ramsey Canon, Arizona, April 6, 1930. This is practically Samuela faxoniana Trel.

Yucca Schottii Eng. Ramsey Canon, Arizona, April 6, 1930. Leaves only.

Yucca caniliculata Hook. This is Samuela Carnerosana Trel. Y. Trecuiana Carr. Sierra Blanca, Tex., April 11, 1930. A form nearer true canaliculata also from Sierra Blanca, April 11, 1930. A form about the same as Samuela Faxoniana from Indian Hot Springs, April 29, 1930. An intermediate form from Colossal Cave, Arizona, May 6, 1930. Also another form from east of Lordsburg, N. M., May 6, 1930.

Yucca rupicola Scheele. Devil's river, Texas, April 26, 1930.

In going east from the Needles, California, along the highway, I had a chance to make more notes on Yucca. Near Hackberry, which is near the upper limit of the Tropical, Yucca Mohavensis disappeared quite suddenly and Y. baccata came in strong and continues strong to the lower limit of the Middle Temperate near Williams, where it quit off suddenly and Y. angustissima came in and continued nearly to Williams. In its zone Y. Mohavensis rarely reaches 15 feet in height and had few stolons, and was in full fruit (June 15) and some pods being full sized. The fruit is spreading, or rarely fully pendent. It is rounded at the end and apiculate and about four inches long normally, though very often only two inches long and much stung by insects. When not stung there is no constriction in or near the middle. The leaves always have the Samuela fringe on the margins, the fringe being of coarse hairs. Those who are familiar with Trelease's figure of Samuela Carnerosana will know what I mena. The hairs on the margin of typical Samuela peel up in regular order and are about four inches long, arching backward. This is quite a conspicuous feature, but the regularity is subject to great variation, and often nearly disappears in some plants The leaves of Mohavensis are apple-green and normally 2 to 4 feet long, erect-spreading, straight and always channeled but not so deeply as in baccata. The panicle is rarely peduncled, a foot long, round to obovate or rarely oblanceolate, and a little exserted at tip (beyond the leaves). It is very common north of Amboy and continues nearly to the Needles, and is less common on the Arizona side to Hackberry. Some stemless forms simulate baccata in the blueness of the leaves.

On the other hand Yucca baccata is conspicuously caespitose with several stolons which very rarely have any trunk at all, though cases occur with stems two feet high. The leaves are inclined to be incurved at tip and nearly always arcuate, blue, with the same fringe as Mohavensis, much deeper channeled, and narrower normally. The panicle is linear, much fewer flowered, rarely oblonceolate, two feet long. The pods are conspicuously acuminate, about four inches long by two wide, and mostly pendent.

They should be fleshy when mature. The flowers are very narrowly pear-shaped, short-stiped, white with linear and blue-striped petals (perianth), with tips spreading. The stipe is ¼ inch long as in Samucla. The species can always be separated from Mohavensis by the pods.

Nolina Texana ? This comes in along the road in the upper edge of the juniper belt, west of Williams, on dry knolls. The panicles are 3 to 6 feet long and with short peducle at base, very different from N. Bigelovii at Oatman, which was also in full bloom.

Caulanthus annuus. N. Sp. Annuals, 2-3 feet high and erect. Racemosely branching above, and with the branches terminating in a naked raceme about a foot long in fruit, but flowers inclined to be capitate at first. All the leaves sessile and clasping but not perfoliate, entire, rounded at both ends, the lowest inclined to be obovate-elliptical, the middle ones elliptical-oblong and the uppermost ovate-elliptical, about 3 inches long, flat, the upper somewhat reduced, the internodes somewhat shorter than the leaves. Flowers bractless, narrow, nearly half an inch long, with linear and slightly saccate bases, and tips inclined to spread, and purplish, thin petals nearly white, flat, linear-spatulate, entire, a little longer than the sepals, very thin, and a little longer than the linear and sagittate and twisted anthers. Pods on stout and ascending pedicels half an inch long and which are 1-2 inches apart. Pods inclined to be tetrangular, 2mm. wide and 5-6 inches long, indifferently ascending, and rather lax, with a stout beak 1-2 mm. long, whole plant smooth. Leaves inclined to be palmately veined below. Growing in waste places on slopes in the pine forests. Middle Temperate life zone, above Canon City, Oregon. The plant has the habit of Streptanthus orbicularis.

Lepidium montanum Nutt. This species as usually understood is a hodge-podge. The type is described as having elliptical pods, which is a character of the plants growing around Grand Junction, Colorado, and which seem to pass into L. alyssoides and have a short style. The majority of the material from the north (Wyo. to Oregon) and south at least to central Utah, has cordate-ovate pods, reticulate pitted, distinctly stipitate, and with style half as long as the pod, and top of pedicel somewhat winged. This would come between L. Cradallii Rydberg and L. papilliferum (Hend.) Nels McB., both of which seem to be spurious species. It is unfortunate that we cannot use either proposed species as a variety of L. montanum, though Crandallii is nearer than the other but founded on a pod too long and without the rugose sides. L. papilliferum is described as having orbicular pods and short style. Now the form of this species (montanum) common in northern Nevada, is striking and quite different from typical montanum. There is a great variability in the length of style, from not longer than the notch to 1mm. long. But the same general habit, being a short-lived perennial. Collectors have confused forms of L. medium Greene with this species from the north. I doubt if any forms of alyssoides occur anywhere in the north, with which they have confused the same species (L. medium).

Stanleya annua N. Sp. No. 25317, Stems annual, erect, 2-4 feet high and simple, not angled nor winged, glauous and smooth throughout. Leaves

lanceolate and rather acuminate, apparently entire, 3-4 inches long, the lower auriculate clasping and the upper hastate clasping. Fruit i na long and simple raceme 1-3 feet long which is densely flowered with ascending fruit. Pedicels an inch long and filiform, with stipe nearly as long and ascending. Fruit about 2 inches long, by 2mm. wide, slightly torulose, laterally flattened, a little arched, ending in a short beak about 1-2 mm. long. Flower not seen. Frequent along the roadside at Huntington, Oregon, June 25, 1930. The species of Stanleya are described as perennials, but S. elata is a biennial, and this is clearly an annual.

Populus balsamifera L. In 1930 I had exceptional opportunity to study this species in the Wallowa mountains, Oregon. There can be no doubt of the specific identity of this and P. trichocarpa, the difference being only varietal. The tree has the same habit, the leaves are the same, the only difference lies in the hairy pod of trichocarpa, a character truly not specific.

Nolina Bigelovii was a conspicuous plant near the upper slopes of the mountain at Oatman on the eastern side, and reminded me of the magnificent Yucca Whipplei of our California slopes. The panicles were several feet long and rather golden yellow and wand-like and long stalked. I found both male and female plants in full bloom about the middle of June.

Astragalus fallax has the habit of Sileranus nearly and the same pubescence and grows on open mesas east of Williams, along with a Calochortus of the Nuttallii group. It is a little more erect than Sileranus and not with the same tendency to be trailing, but I incline to think the two species belong in the same group of the inflati.

Astragalus Cobrensis Gray. As shown in my revision of the genus this species is closely related to A. Brandegei. I had never seen it growing, nor did I know its habit or habitat. I got the species on the live oak hills west of Silver City, New Mexico, and found its habit just the same as that of Brandegei for it grows under and in the interspaces of the oak brush. The plants are perennial from deep-seated and thick roots which a few inches below the surface branch at the crown into innumerable filiform stems which do not root at the nodes, and which are often a foot long before they rise above the ground and form a tuft of leaves at the end. The proper stems in the air are a few inches long and erect or nearly so, and freely branch into slender and tortuous stems with terminal and short racemes of bluish flowers and few pods. The pods are narrowly oblong and blunt at both ends and triquetrous-cordate in cross-section and pendent. The plant was in fruit early in May, 1930.

Astragalus Thurberi Gray. This plant does not seem to have been collected very often, if at all, and is not mentioned by Coulter in the Flora of Texas, though it ought to be common in western Texas, nor by Standley in the Flora of New Mexico, though it is frequent throughout the southern part of the state, growing in the same situations as A. playanus, and often with it. It would be easy to confound it with small forms of playanus, but so far as I have seen it does not hybridize with it. I have one collection

that may be a hybrid but the pods are too small. I have often seen them growing side by side but without any sign of intergrading.

It is a short lived perennial, with many stems from the same root and spreading out to form a mat at times two feet in diameter, the central stems being erect. I was in error on page 102 of my monograph in saying that it grows in the Lower Temperate life zone, for it is found only in the Tropical. It abounds on sandy plains. My collection are east of Lordsburg, N. M., May 5, 1930. Foot of Ramsey Canon, Huachuca Mts., April 6, 1930. I saw it in several other places but did not collect it. Miss Eastwood also collected it at Silver City, New Mexico.

Astragalus allochrous Gray. This plant seems to include playanus Jones. At least I can find no permanent character to separate them, while there seems to be an intergradateion toward triflorus D. C. This plant is quite common on sandy places and on plains throughout southern Arizona and New Mexico. It is certainly a short-lived perennial blooming the first year.

Astragalus lentiginosus var. palans Jones. I very unexpectedly found this on the Papago Reservation west of Tucson, May 7, 1930.

Astragalus remulcus Jones. It is quite possible that this is too near Pephragmenus Jones, but the pods are too acute. The plant is manifestly near to argophyllus but I thing distinct from it because of the smaller flowers and habit. I have it from Silver City, N. M., May 4, 1930, just in the edge of the Tropical life zone.

Oxytropis nothoxys (Gray) Jones. I have this in exactly typical material from Texas Canon, near Dragoon, Arizona, May 6, 1930. It grows flat on the ground in fine gravel and is perennial. Mouth of Ramsey Canon, Arizona, April 6, 1930.

Astralagus didymocarpus H. & A., growing in sandy places 40 miles north of Tucson, Arizona, April 5, 1930.

Astragalus Nuttallianus D. C. I have this in half a dozen different forms but I do not think they deserve varietal rank. Sonora, Tex., Apr. 13, 1930; Rock Springs, Tex., Apr. 16, 1930; Sierra Blanca, Tex., Apr. 11, 1930.

Astragalus mollissimus Torr. Hope, N. M., May 2, 1930. This seems typical. It is a robust plant a foot and a half high, with large and purple flowers, and cylindrical pods arcuate somewhat and cross-nerved and sulcate at both sutures and linear-oblong and apiculate, rigid.

Astragalus giganteus Watson. This seems to be the same as the species recently described by Prof. Cory. I cannot see any valid distiction between this and A. mollissimus. The pod is broadly oblong instead of narrowly so, and the flowers are yellowish. Rydberg describes A. mollissimus as being "caespitose" but the plant is simply densely tufted like all the other allied species. The best that could be done with it would be to call it a variety of mollissimus. Ozona, Tex., Apr 13, 1930.

Astragalus Bigelovii Gray. This plant varies from mollissimus in the

pubescence being silky-woolly instead of appressed-hairy, and in the shaggy-hairy pods. Silver City, N. M., May 4, 1930. East of Lordsburg, N. M., May 5, 1930. These plants were low and widely spreading and with short peduncles. Ramsey Canon near the mouth, Apr. 6, 1930. These plants were tall, two feet high and mostly erect. This species seems to be more common than mollissimus.

Astragalus Earlei, Greene. This species looks like a small-fllowered form of Bigelovii with narrower pod (lance-oblong) and barely short-pubescent pods. The pubescence of the whole plant is short and dense. Alpine, Tex., Apr. 20, 1930; Marathon, Tex., Apr. 24, 1930.

Astragalus marcidus Greene. Whole plant softly shaggy-long-woolly even to the pods. Flowers small and purple in a dense and elongated spike. Pods depressed-globose and barely apiculate, 4-6 mm. long, concealed by the calyx. This is a counterpart to A. Matthewsii but the pods only about a quarter as large.

All these species lead one to think that the Mollissimi group is very variable and that the species are confluent.

Astragalus crassicarpus Nutt. Alpine, Tex., Apr. 26, 1930. This is a species with a single erect and thick root with a crown of many stems spreading in all directions, the lateral ones decumbent or prostrate in fruit. The pods vary from spherical to broadly oblong. This includes Rydberg's Geoprumnon succulentum and A. prunifer. The Texan plants are unusually small, but with the characteristic root.

Astragalus Plattensis Nutt. I should judge that this includes A. pachycarpus T. & G., which I referred to crassicarpus as a variety in my monograph. Torrey and Gray did not know anything about the root system of this plant, but the shape and character of the pod would place it with Plattensis. However the status of the species can be determined at once if it belongs to Plattensis, for this species is entirely different from crassicarpus whose root is single, fleshy and erect and with all the stems coming out from the crown. A. Plattensis however has no main root but sends out many underground rootstocks with branches in all directions and send up single and slender stems. The whole plant is softly woolly-hairy all over, and the globose-oblong pods are vertically flattened and sulcate ventrally and pubescent at first. The habit of the species is much the same as A. agrestis (hypoglottis). Ozona, Tex., growing with A. giganteus, on mesas among the oak brush.

Astragalus humistratus Gray. This is the white-pubescent early form which Wooton and Standley call albulus. Organ pass, N. M., May 3, 1930. Also on the Gila river, N. M., near Silver City, May 4, 1930; Lordsburg, N. M., May 5, 1930 and at Silver City, May 4, 1930.

Astragalus allochrous Gray. Localities where I got this are Organ Pass, N. M., May 3, 1930; Deming, N. M., Apr. 9, 1930; Lordsburg, N. M., May 5, 1930 and Apr. 9, 1930; Fort Davis, Apr. 28, 1930; Texas Canon,

Ariz., May 6, 1930. A possible hybrid with Thurberi is from Alpine, Tex., Apr. 26, 1930.

Astragalus sinuatus Piper Torr. Bull. 28 40. Considering the place of this species in the genus it was not properly described, nor would there be any means of determining whether it was a form of Gibbsii (where I referred it) or speirocarpus. The locality, however, "No 793 Brandegee, eastern Washington," would tend to tie it up with specimens got by me in Bruneau, Idaho, and Stein's mountain, Nevada, in 1930. In critical characters the description fails utterly. Then the absence of flowers in the type complicates things. The specimens collected by me show a very close relationship with A. speirocarpus. On the other hand no one seems to know for sure what are flowers of speirocarpus, or its exact habitat. In my revision I put speirocarpus in the group of Gibbsii and collinus with stubby ochroleucous flowers. If that reference is right then sinuatus is a good species, assuming of course that my material is A. sinuatus. Without repeating the characters given by Piper, I will say that the plants have the habit of A. fallax, that is they are erect spreading. The flowers are about the size, color and shape of A. cibarius, that is narrow and not at all stubby, but with broad and short wings, and purple, but the calyx is that of Gibsii. The pods are conspicuously laterally flattened and sharp-ridged, almost winged on the sutures, and coiled into a complete or double circle or sometimes not into a third of a circle, and are sharply cuspidate acumnate at very tip, pendent, and either softly and shortly woolly-pubescent or smooth, low-rugose, not inflated, opening along the stipe toward the tip at sutures. The pods are also mottled often. No doubt this species is intermediate between Gibsii and speirocarpus, but the flowers are conspicuously different. The calyx is inflated and yellowish, as in Gibbsii. A. speirocarpus is reported as growing on sand dunes in the region east of the Dalles. This plant grows indifferently on gravelly slopes or sandy areas. Since the localities in which this plant is found are so far apart, there will be no trouble in getting all its characters, but more study must be had on true speirocarpus.

Lupinus platanophilus N. Sp. Plants low and caespitose after the fashion of Lyalii, from a perennial root. Proper stems simple, rarely branched below, erect or spreading, rather thick and fleshy, with the nodes aggregated and the leaves clustered near the base, rarely over 6 inches high. Whole plant rather finely shaggy with loosely appressed and wavy hairs which are widely spreading on the filiform petioles. Petioles 4-6 inches long and spreading, with the base abruptly enlarged into a 10-nerved sheath which is about an inch long. Leaflets about 6, cuneate-obovate to oblanceolate, flat and apiculate, 1 to 1 1-2 inches long and nearly half as wide. Peduncles about 4 inches long. Flowers light purple, about 5mm. long, ascending on capillary pedicels about 4mm. long, with the silvery-hairy calyx deeply 2-cleft nearly to the base. Banner round and about 3 mm. long, abruptly recurved at calyx tips and purple-tipped, about 1 mm. shorter that the deltoid and very broad wings which cover it. Immature pods shaggy. The leaves are fleshy and hard to dry. The plants have the habit of L. concinnus. Grow-

ing under sycamore and alders on moist flats near the creek in Ramsey Canon, Huachuca Mts., Ariz., Apr. 6, 1930.

Chenopodium capillare N. Sp. A slender annual hardly a foot high, dichotomously branched from the base into a rounded mass about as wide as high, glaucous-green throughout and smooth except for dense scurf on the flowers and scattered on the young parts. The general appearance is that of Teloxys or Chenopodium botrys. The whole of the upper half is a mass of dichotomous pyramidal inflorescence, with the flowers about sessile in the forks and one to few there, and with the terminal one on a long and capillary (pseudo) pedicel 1 cm. long or less. Stamens apparently 1-2 and barely exserted. Flowers about 1 mm. wide and depressed-lenticular, with 5 oblong-ovate sepals very scurfy, which are spreading at maturity, or at least open somewhat. Seed single, lenticular, much flattened and with rounded and rugose edges, and dark, 1-2 mm. wide, with embryo coiled in a circle. Leaves lanceolate with cuneate base, on a capillary petiole not over half its length, barely an inch long. Leaves many. Growing in sand along with Abronia Crux-Maltae, etc. Carson Sink near Wadsworth, July 7, 1930.

Mentzelia acerosa N. Sp. Caespitose perennial from a thick and fleshy and erect root. Stems slender, much branched from the base, white-barked and bary densely white-pubescent, and stems closeset and tangled, very leafy throughout and with short internodes, particularly above, and becoming fascicled, and with the few flowers sessile among the leaves at the ends. Leaves 1-3 inches long, pinnately cleft to the base into 3-5 divisions which are subulate-acuminate into a sharp spine and very pubescent with very short and stiff and warty hairs spreading at right angles, with revolute margins and raised midrib, leaves sessile and thick. Flowers yellow, about 1 cm. long, with the 5 lanceolate petals sharply acute and hairy on the outside, and surpassed by the many stamens which have capillary filaments and oval anthers. Calyx lobes subulate and as long as the petals. Fruit ovate, about 5 mm. long, rough-hairy; seeds smooth, oblong, hardly 1 mm. long, apparently 3-angled and winged on the angles. Plants growing on bare clay hills near Bruneau, Idaho, June 23, 1930.

Phacelia Alvordensis N. Sp. Allied to distans. In the shade of bushes Salix and Prunus demissa, on the lower slopes of Stein's moutain, Oregon. July 5, 1930. Perennial apparently, with many stems 2-3 feet high straggling upward, but weak. Leaves thin and flabby, six inches or less long, the lower ones only petioled, pinnate into seven to ten distant leaflets sessile on the rachis, narrowly oblong and an inch or two long, acute and deeply cut into few deltoid teeth, sparsely and finely spreading-hairy and a little glutinous, but appearing as if almost glabrous. The stems softly and finely spreading hairy and glutinous, and terminating in one to several rounded and scorpioid racemes an inch or two long, the whole conspicuously yellowish-hairy with very long and slender setae 3-4 mm. long. Corolla barely surpassing the calyx lobes, a dirty-white, with the lobes rotately spreading and round. Filaments coiled and not so exserted, but much longer than the corolla which is about 6 mm. long. Calyx lobes very narrowly linear and

but little narrowed below, acute, very setose, twice as long as the oblong-ovate pods. Seeds elliptical, 1mm. long, acutish at both ends, conspicuously alveolate pitted, few.

Hymenopappus flavescens is described as biennial. It surely is a perennial.

Bahia depressa N. Sp. A low perennial a few inches high and much branched from the base, with short internodes and overlapping leaves which are about an inch long and spatulate and entire, and but little reduced above. Whole plant white-floccose even to the involucre. Heads terminal and lateral, on stout peduncles about as long as heads which are ½ inch high. Bracts of involucre oblong, erect and rather rigid, not spreading in fruit, with about 3 yellowish glands toward the tip (not visible except on looking through the bracts), forming a cup from which the ripened flowers fall. Rays several, yellow and about half as long as the heads, fertile and with the fruit inclined to be flattened and black. Pappus of about 5 scales tapering into denticulate awns as long as the body. Seeds appressed-pubescent. Growing on Cliffs near the Devil's river, Texas, April 22, 1930.

Stephanomeria minima N. Sp. A weak and widely spreading annual, divaricately much branched, a few inches high, leaves clustered at base mostly, the stem ones much reduced and bract-like. Basal leaves lanceolate and sharply and coarsely toothed, an inch or two long. Inflorescence cymosely branched with single heads at the nodes and which are about an inch long and pedicels bracted above the middle. Heads 4mm. long, smooth, light yellow, linear, with 4 linear bracts a little flaring at tip and purplish there, green, and with a single broad bract at base. Flowers 4. Akenes linear, truncate, not rugose but minutely roughened, with 4 strong ribs flattish on the top, each rib with a very thin and raised central line and with as minute single grooves on each side, yellow, pappus consists of a ring of white bristles, about 20 to 25 in number which are barbellate but not plumose, which come off from the akene in a body. Bristle about as long as the akenes, which are as long as the involucral bracts. Growing on the clayey plains at Fredonia, Arizona, June 1, 1929. This no doubt has been lumped in with S. exigua.